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[1] Based on IBM comparison of configuration and setup by customer onsite versus delivered by IBM using Intelligent Cluster service, which is an optional feature available at additional cost.

[2] 3x cores based on industry standard 42U rack comparing 42 1U x3550 M4 rack servers with 2 Intel® Xeon® E5-2600 processors 8 cores each = 672 cores vs. 84 NeXtScale System nx360 m4 nodes with 2 Intel Xeon E5-2600 v2 processors 12 cores each for 2016 total cores.

[3] SPECint_rate_base2006 - 669 on IBM iDataPlex dx360 M4 (Intel Xeon E5-2690) vs. 918 on IBM NeXtScale nx360 M4 (Intel Xeon E5-2697 v2). www.spec.org. Results current as of 9/20/13.

[4] SPECpower_ssj2008 - 5392 on IBM iDataPlex dx360 M4 vs. 7347 on IBM NeXtScale nx360 M4. www.spec.org. Results current as of 9/20/13.

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THINKSTOCK

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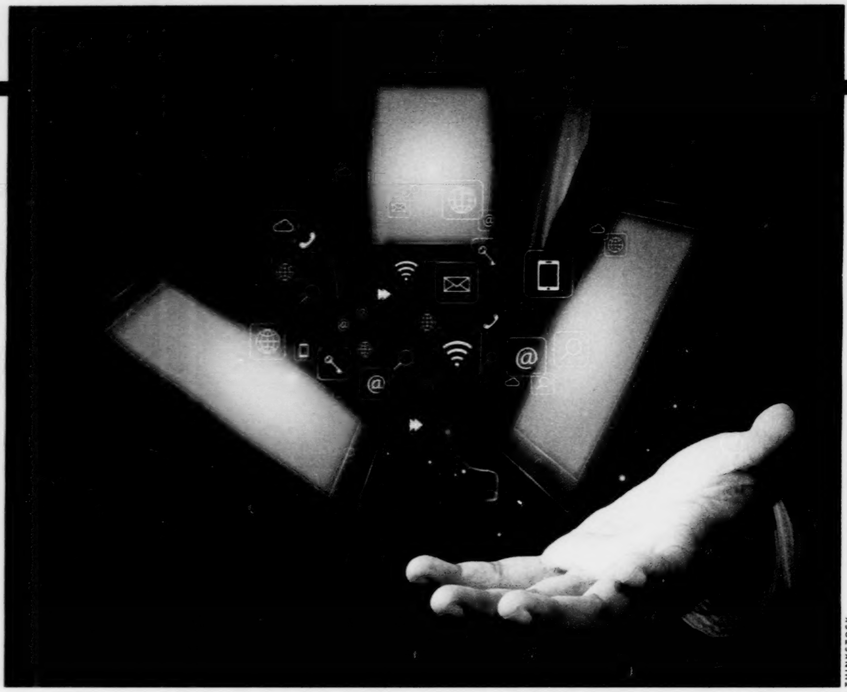
# HeadsUp



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INTERNET

## Internet of Things Is a Work in Progress

**THE NEXT** generation of mobile connected devices may make life easier for consumers in the long run, but today they present a bundle of headaches, a panel of industry leaders said recently.

Smart homes, Internet-connected cars and wearable devices will coexist with smartphones for at least the next few years, though it's hard to predict what mobile will look like 10 years from now.

But beyond convenience and the cool factor, it's still often a chore to live with these devices, and it doesn't get easier as they proliferate, panelists at the Open Mobile Summit said.

"We're about to hit the ceiling of what people are willing to baby-sit," said Mark Rolston, chief creative officer at Frog Design. "How many devices do you want to try and keep alive and awake throughout the day?"

In all, there are too many challenges for users, according to Rick Osterloh, senior vice president of product management at Google's Motorola Mobility subsidiary.

"If you look at what's there today, it's just horribly, terribly broken for the end user," Osterloh said. "There's so much to go fix." He cited manual setup of wireless connections via Bluetooth, Wi-Fi Direct and a hornet's nest of other technologies.

The whole premise of mobile interfaces is wrong, according to Osterloh and others. They said devices should be asking users what they want and learning from prior events rather than always forcing users to ask.

*– Stephen Lawson, IDG News Service*

MOBILE APPS

## Touch Office: A Huge Challenge For Microsoft

Microsoft's plan for its upcoming touch-based Office suite represents a huge test for the company.

"There's really nothing out there in the mobile world that provides anything near the power of Office on the desktop," said Ross Rubin, an analyst at Reticle Research. "It will be a massive challenge to preserve even the majority of that functionality."

Microsoft has said it will release touch-enabled versions of Excel, Outlook, PowerPoint and Word, but it has provided no clues as to what that suite will be like or when it will ship.

Deciding what stays or goes will be crucial to how the touch apps are perceived. They could be replacements or companions for the powerhouse desktop suite, or they might be fit only for casual use, analysts say.

Microsoft will either have to ditch swaths of features or devise a user interface that can hide most functionality but still give users a way to find the tools they need.

Analysts don't doubt Microsoft's development acumen, but they wonder what choices the company will make.

A touch version of Office would face competition from Apple and Google, which each now offer limited-feature office suites – iWork and Quickoffice, respectively – free of charge.

– GREGG KEIZER

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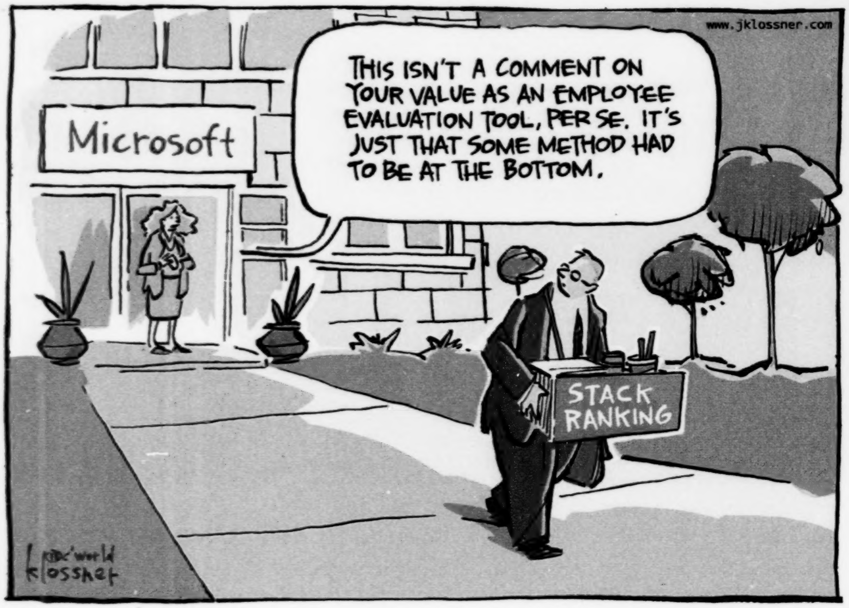
**BETWEEN THE LINES**

By John Klossner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**CLOUD COMPUTING**

## BNSF Heads to the Cloud With Microsoft

**WHEN BNSF RAILWAY** decided it would move its email and collaboration systems from its own premises to a public cloud, it considered offerings from various vendors, but ultimately picked Microsoft's Office 365.

The railroad's reasons were varied, but familiarity with Microsoft products and a long-standing relationship with the vendor were major factors in the decision.

"We're a big Microsoft shop, so Office 365 was a very good fit for us. It just made sense," says Jo-ann Olsovsky, CIO at the Fort Worth, Texas-based freight transportation company.

BNSF expected to finish migrating its 40,000 employees to Office 365's Exchange Online and Lync Online by mid-December. At a later phase, it will switch its intranet and customer-facing portals to SharePoint Online and adopt SkyDrive Pro for cloud storage.

Like many other organizations, BNSF decided to move email and collaboration tools to the cloud to give its IT staff more time to focus on business-critical systems.

Because railway companies have such specific operations and needs, BNSF has had to build a lot of custom IT systems, and maintaining and improving those systems is more important than tussling with email and collaboration servers.

Office 365 is also expected to bring other benefits. For example, it offers a significantly larger inbox capacity, and email and collaboration capabilities will be more easily and broadly available to BNSF staffers, some 90% of whom work remotely.

Olsovsky is also looking forward to Microsoft's continued integration of the Yammer enterprise social networking tool with SharePoint and with other products.

BNSF employees started using Yammer last year on an ad hoc basis, shortly before Microsoft acquired the company for $1.2 billion, she said, and the tool is now being used as a blogging platform at the company.

*– Juan Carlos Perez, IDG News Service*

## Micro Burst

The top five Microsoft execs saw their compensation fall

**3.7%**

in fiscal 2013, after two years of 22%-plus pay increases.

**WEARABLE TECH**

## Google Making Tattoo That's A Microphone

Google already has Google Glass, but now it's taking the wearable technology concept a big step further: It's developing an electronic skin tattoo for the throat that can act as a microphone for a smartphone, tablet or other device.

Throat microphones were first used during World War II, worn by pilots to improve wireless communication between personnel on the ground and in noisy airplanes.

The technology that Google's Motorola Mobility unit describes in its Nov. 7 U.S. patent application is for "coupling an electronic skin tattoo to a mobile communication device." The tattoo would connect via near field communication, Bluetooth, infrared or other short-range technology with a nearby smartphone, tablet, wearable computer, gaming unit or other mobile device.

The patent filing says the tattoo could also have a power supply to receive energy from another place on the user's body, or perhaps the ability to function as a lie detector.

Google didn't respond to a request for comment on the patent application. It's not clear what users will think about microphone tattoos. "Some might think it's cool," said analyst Jack Gold, "but mass market?"

– MATT HAMBLEN

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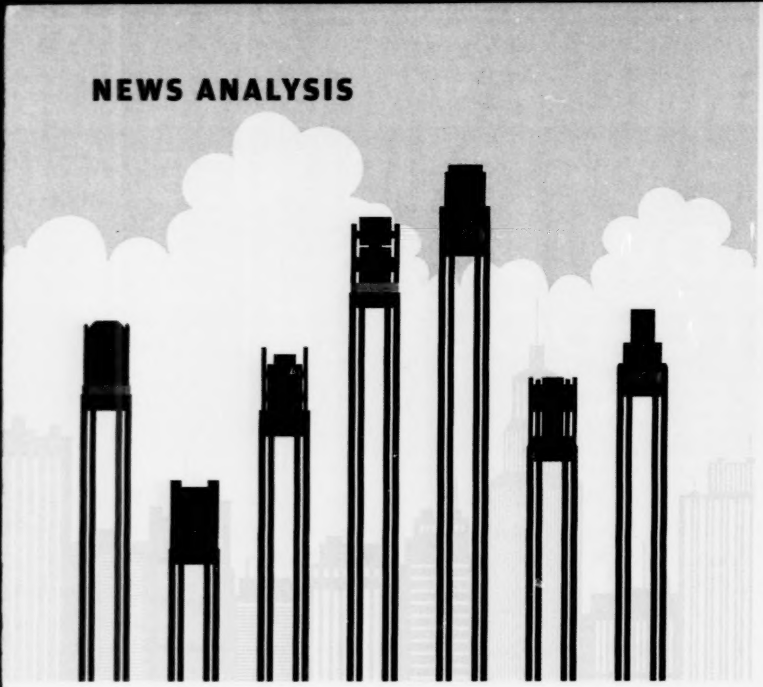

# 'Stack Ranking' Falls Out of Favor

## Microsoft joins employers across the country in ditching the oft-criticized method of evaluating workers. By Gregg Keizer

**MICROSOFT'S DECISION** to abandon its so-called "stack ranking" method of evaluating employees is no surprise in light of recent trends in human resources management.

Stack ranking "does appear to be out of favor," said Kerry Chou, a senior practice leader with WorldatWork, an association of HR professionals. "More organizations are ending the practice where you have to have, for example, 10% or 5% of all employees in the lowest-ranked category."

A recent WorldatWork survey found that forced ranking, the association's term for stack ranking, is now used by just 12% of U.S. companies.

Chou said the method is at the "extreme" end of management philosophies, and is thus losing favor. Some onetime proponents of the method, he said, "are now saying that the benefits were outweighed by the cultural cost."

"In Microsoft's case, apparently the cost of doing this outweighed the benefits they thought they were getting," Chou theorized.

Microsoft's stack ranking policy required team leaders to assign set percentages of their members to five categories of performance rankings, from top to bottom. It forced managers to give a predetermined number of employees top, fair or bad annual reviews, even if all of them did an excellent job.

As at most companies using the method, people who received the highest rankings were given promotions and awarded bonuses, while those at the bottom were pushed out or left of their own accord.

By all accounts, the stack ranking method was widely disparaged by employees, who said it created a cutthroat culture, pitting Microsoft workers and teams against one another.

Analysts say the competitive climate often limited Microsoft's ability to innovate or keep pace with rivals like Google and Apple in areas like search and tablets. More energy was spent in-fighting or actively sabotaging the efforts of internal rivals than in moving Microsoft forward.

In one oft-cited example, it's believed that the Windows team was concerned primarily with meeting its own goals — and thereby improving its chances of getting bonuses and promotions — when it overruled the Office team's proposal to sell an iPad-specific version of Office.

CEO Steve Ballmer began to reorganize Microsoft last summer, partly to get better collaboration among teams, but he left the stack ranking program untouched.

Then in an email to employees in November, Lisa Brummel, executive vice president of human resources, said the program would be eliminated "to better align with the goals of our One Microsoft strategy," referring to Ballmer's reorganization plan. "This is a fundamentally new approach to performance and development designed to promote new levels of teamwork."

Critics of Microsoft's policy, including past employees and managers, often called the stack ranking unfair because it forced them to put into the lowest bucket some people who they felt were better than the best on other teams.

Chou noted that the tendency for managers to think that their employees are better than those on other teams is widespread — and perfectly understandable. In fact, he said, some employers adopt forced ranking practices to dampen that instinct and instill more discipline into the employee evaluation process. ◆

**Loek Essers** *of the IDG News Service contributed to this story.*

In Microsoft's case, apparently **the cost of doing this outweighed the benefits** they thought they were getting.

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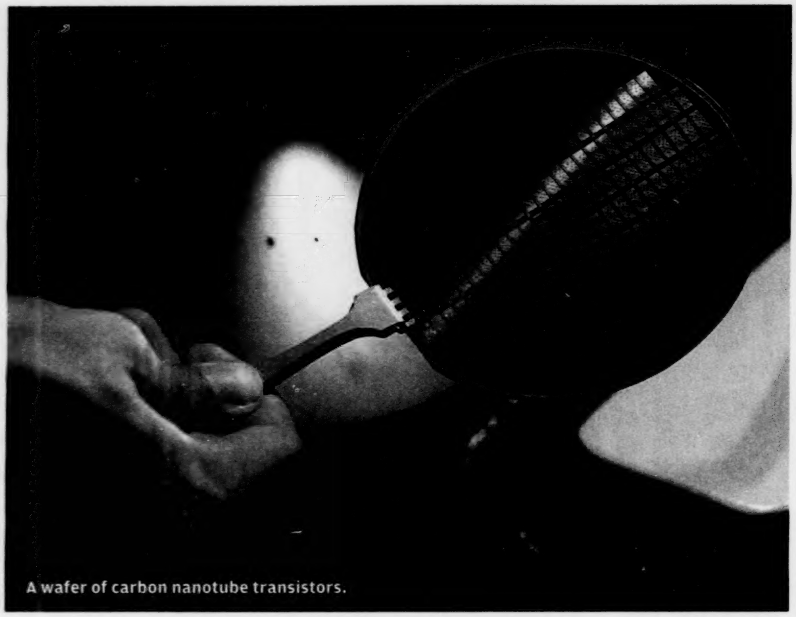

A wafer of carbon nanotube transistors.

# Supercomputing Needs New Tech

**With Moore's Law in decline, high-performance computing faces a plateau unless a disruptive technology saves the day. By Patrick Thibodeau**

A **LITTLE BOOTH** tucked away in the corner of the Colorado Convention Center in Denver last month may have housed the next Intel.

Max Shulaker, a Stanford University graduate student, was there, ready to explain carbon nanotube digital circuits to any SC13 supercomputer conference attendee that stopped by. Shulaker is part of a research team that has made what they claim is the first computer built using carbon nanotubes, or CNTs.

The result is a system that does 10 times better than current systems on a metric that takes performance and energy use into account.

Such breakthroughs are vital because, while experts agree that silicon-based systems can no longer continue improving at the rate predicted by Moore's Law, there's no consensus on what can replace silicon.

> We have **reached the end** of the technological era.

Moore's Law states that the number of transistors on an integrated circuit doubles every two years. And since it became apparent that that principle no longer holds true, supercomputer developers have had to rely on very expensive architectural changes, such as adding speedy GPUs, to boost performance. In the near future, they may have to increasingly turn to chips that integrate interconnects and memory to speed processing and reduce energy consumption.

The problem promises to blunt the relentless pursuit of ever greater computing power to run increasingly complex simulations to tackle mankind's big problems.

"We have reached the end of the technological era," said William Gropp, chairman of the SC13 conference and a computer science professor at the University of Illinois at Urbana-Champaign.

Gropp likened today's supercomputer development terrain to that of the 1960s, which saw the advent of CMOS, the foundation of today's standard semiconductor technology. CMOS was disruptive, but it ushered in an expansive age of computing.

"We don't have a technology that is ready to be adopted as a replacement for CMOS," said Gropp.

But change will come, and it will be disruptive.

One option is carbon nanotubes, essentially rolled-up sheets of grapheme that form nanocylinders with a diameter of about 1 nanometer. About 10,000 carbon nanotubes side by side would fit inside a single human hair, said Shulaker, who is working on the technology at Stanford with professors Subhasish Mitra and Philip Wong.

This Stanford team synthesized their own nanotubes by taking a quartz wafer and adding iron nanoparticles and then heating it to 1,652 degrees Fahrenheit. The CNTs then become the channel for the transistor, which turns on and off.

The team has worked to ensure that the leap to next-generation technology isn't insurmountable for experts in silicon. For instance, they emulated the MIPS instruction set, making it programmable. "Everything we do is silicon-compatible," said Shulaker.

It's uncertain where the next-generation supercomputer technology, whether CNT or something else, will come from.

There's no reason to believe that the companies now leading the industry will necessarily have the big advantage, said Peter Beckman, a computer scientist in the Department of Energy's Argonne National Laboratory and head of an international exascale software effort, adding that the replacement technologies could easily come from companies working with materials "that aren't anywhere near silicon."

Meanwhile, he said, "we're going to have this plateau in our technology." ◆

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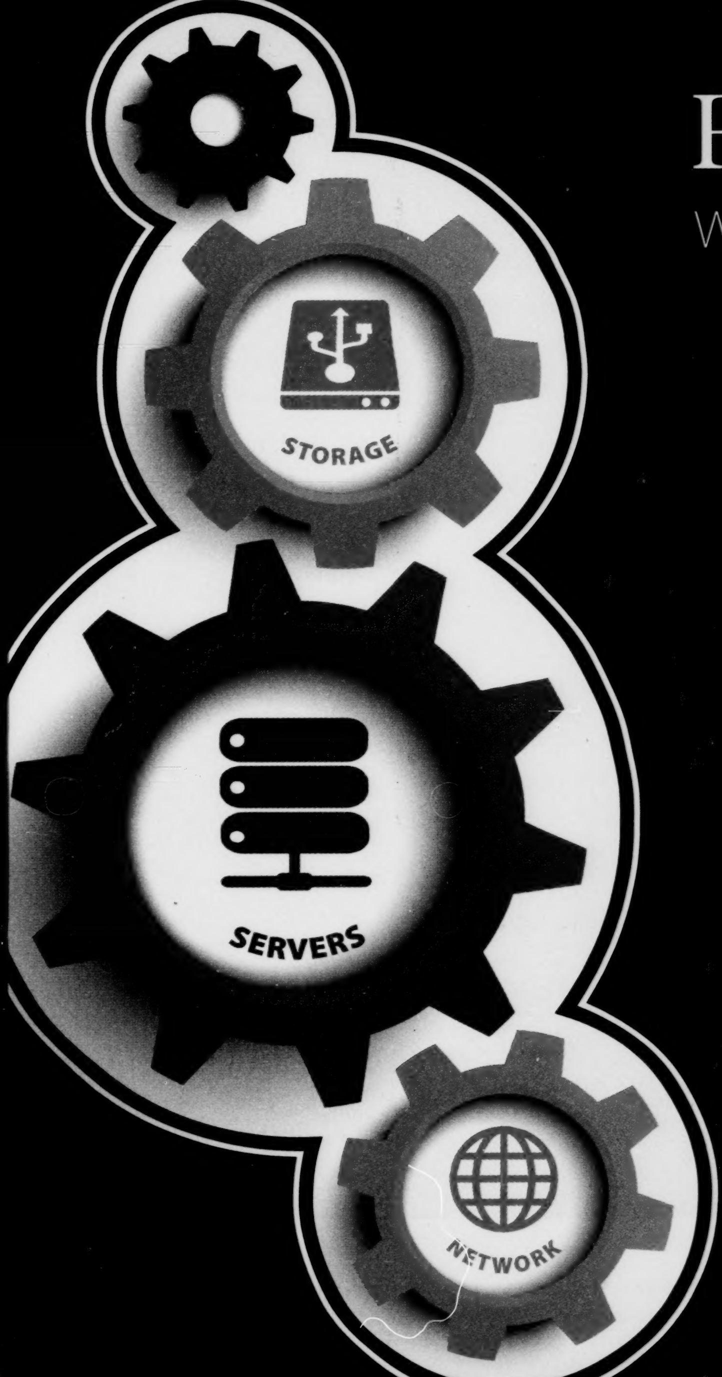

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# THE Grill

## Kimberly Stevenson

Intel's IT leader is focused on speeding up product delivery, driving revenue and creating efficiencies.

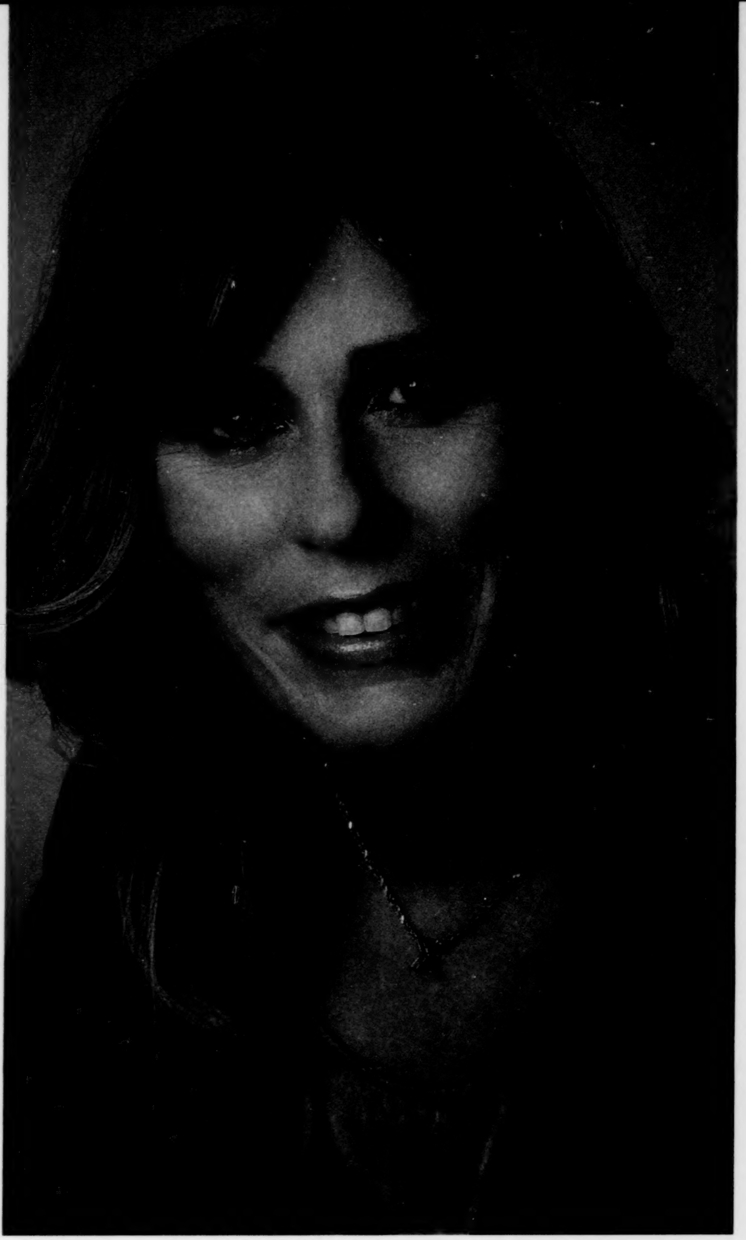
**If you weren't in IT, what would you do?** Run a sports franchise (using IT to drive wins).

**What's the next step in your career?** "Increasing my impact is what drives me. Whatever is next will have to have the opportunity to make a huge impact."

**What do you do in your spare time?** Tennis and travel. "Next trip is a girls' weekend in the Smoky Mountains and Dollywood."

**What's on your reading list?** *The Eye of God*, by James Rollins

**Tell us something about yourself that most people don't know:** "I went to high school on a tall ship and graduated in Monte Carlo."



**KIMBERLY STEVENSON,** *a corporate vice president and CIO at Intel, has spent her professional career immersed in technology, working for some of the world's most recognized technology companies. Not surprisingly, she's a vocal champion for IT and how it will transform business and society. "I love to see all this disruption coming in all different industries, and it's all coming from IT," says Stevenson, one of four finalists for the 2013 MIT Sloan CIO Leadership Award. She shares her ideas on running an IT department, the power of technology and the importance of technologists.*

**How did you approach your first two years on the job?** I came from within the organization, so I had a good bead on what the organization was. It was a well-run IT organization, so when you take on a new challenge, you say: "How am I going to take this well-run team and make it better?" That's the approach I took in the context of the changing business at Intel. The first thing I said is that social networking is going to be one of the

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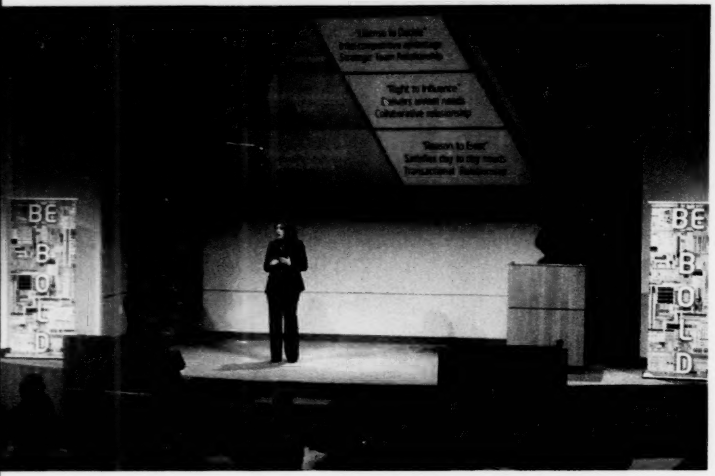


> **We shifted the tide from what IT is capable of doing** to learning what our customers need and figuring out how to do it by taking some risks.

strategy thrusts we had. I thought a few years ago that it will change how enterprises communicate and collaborate, and if IT wasn't leading, then the organization won't change. I championed it as a catalyst for change.

Second, I believed in the strategy I inherited because I was part of the team that developed it, but I had to look at how to refine it and how could I elevate the team to add more value. So we simplified the goals to a few high-impacting things, and we put a focus on building the right culture and added definitions around possibility thinking, risk taking, putting the customers at the center of what we did and acting as one IT. So we shifted the tide from what IT is capable of doing to learning what our customers need and figuring out how to do it by taking some risks. And then we created around these things some visible symbols to reinforce the culture. We changed what got rewarded and recognitions; we aligned them around the priorities we were trying to achieve.

**What are your top one or two priorities?** It helps to understand the context of Intel, which is in the midst of a transformation. There are a couple of things at the core of that. First, we have to get products to market more quickly and the types of products we're making are changing, so a priority is to help that cycle time of getting our products to market. We have many components of how we're going to do that. It ranges from using big data and advanced analytics, to doing another turn on our innovation relative to doing a more enhanced cloud version, to some application development tools.

The second one is that IT helps the company grow revenue, and we have a number of projects around that — [such as a project to increase] field sales productivity. We have an outbound call center, and we use advanced analytics to design how that call center should operate. We're also using collaboration in the field, where we're collaborating directly with our customers to drive overall field sales productivity.

The third is about improving the operational performance of the company, so we're driving across the company a number of initiatives that help us get more efficient.

Those are the three big priorities moving forward, and there are a number of IT initiatives that nest under that.

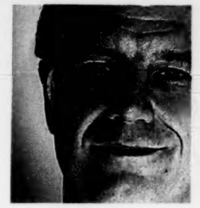
**You have tweeted stories on girls and women in technology. What's your take on addressing the issue?** There isn't a silver bullet. A whole pipeline of things have to happen. You have to keep girls in the STEM [science, technology, engineering and math] areas. We have research that says if you educate a girl, you can change the economics of the entire family and society. So we're interested in educating girls, particularly in the STEM area. Then you have to keep them in through the university programs.

We also did some research that said that girls don't appreciate what an engineering career could be for them. They tend to think that engineering is like a train engineer or a maintenance engineer. But when you have the opportunity to explain what a career in engineering is and the income potential, you can change girls' minds about pursuing a career in the field of engineering. So we have to promote the profession in a way that's educating all kids, but girls in particular.

**How did you get into the technology field?** I was the first in my family to ever graduate from college. I grew up outside of Detroit in the '70s. I graduated from high school in 1980, and there were no jobs. The only reason my parents agreed to let me go to college was to get a job. I ended up interning at IBM, and I learned to program because I had a huge amount of work and it was all manual. I worked a lot of late hours, and I wanted to go out. So I learned to program so I could automate a lot of the work. I was self-motivated, but maybe not for the right reason.

**What kept you in IT?** My defining moment was a few jobs later when IBM was working on what we thought was going to be the first portable PC. There were a lot of challenges with the project, but when we got it done, we were quite proud of it. It was dubbed the "Luggable," and it hit the trade press and it was on every cover. I clipped every article, and I said, "This is going to change how people work and change society," and I knew that I was in this field for my career. I couldn't see anything else that would make such an impact on the world.

*— Interview by* Computerworld *contributing writer*
**Mary K. Pratt** *(marykpratt@verizon.net)*



**OPINION**

# BART PERKINS

## Benchmarking Is Great, When It's Not a Waste

**WE ALL KNOW** the arguments for benchmarking: It lets you compare your costs and service levels against those of similar organizations. It helps you focus your resources on improving any processes that have higher costs or lower service levels than industry norms. It can provide a solid foundation for comprehensive improvement plans.

Here's an argument against benchmarking: It can waste money.

True apples-to-apples comparisons don't come easily. You have to dig around to find out, for example, which accounting rules are used. Does a programmer's hourly cost include bonus and benefits? How about facility, technology and administrative support costs? You also have to make sure you understand how the various organizations in your benchmarking cohort calculate things like application response time, network availability and the percentage of incidents resolved on the first call. Accounting for all of those differences takes a lot of effort and many hours of work — in other words, a lot of money.

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Is benchmarking likely to be a waste of money? The answer could very well be yes if these factors come into play:

- **Weak IT management processes.** It takes several years to fully implement ITIL or to achieve significant improvement from a PMP program, and any benchmarking data gathered will be unfavorable (and likely inaccurate) until the new processes are fully adopted. Premature benchmarking merely indicates the size of the improvement opportunity. While this may motivate some organizations, the same information can be gathered more quickly by consulting someone who's an expert in ITIL, PMP, Cobit or other control process.
- **Poor IT accounting and weak metrics.** When internal processes are weak, data collection becomes quite complex. The benchmarking team needs to make assumptions about data allocation and must combine data from multiple sources. While this may be sufficient for planning purposes (which only need to be directionally correct), true benchmarking implies a high degree of precision. Even minor allocation errors make the analysis less precise and allow skeptics and critics to challenge the data and associated conclusions.
- **Executives who aren't yet committed to change.** Benchmarks help organizations determine *how* to change, but not *why*. IT leaders frequently base decisions on logic and rigorous analysis and will understand the need for process changes merely from benchmark results. But many executives want compelling arguments in addition to data; they want passion, energy and inspiration. With such executives, benchmarking is insufficient, and perhaps even irrelevant.
- **A need for radical restructuring.** Benchmarking only identifies opportunities to make incremental improvements to existing processes. When you need to rethink your mission, redesign the organizational structure, increase customer engagement or alter the way you deliver products and services, benchmarking is a total waste. It will have value only after you resolve the bigger issues.

Benchmarking requires a stable context, a significant investment of resources and periodic refreshes. Use them wisely. It's a diagnostic tool, not a replacement for sound business decisions. And certainly not a magic potion. Don't even think about benchmarking if you don't know how to use the results. ◆

**Bart Perkins** is managing partner at Louisville, Ky.-based Leverage Partners, which helps organizations invest well in IT. Contact him at BartPerkins@LeveragePartners.com.

# FUELED *by* ANALYTICS

How Ford is using big data to drive virtually every aspect of its global turnaround.

**BY JULIA KING**

## "DATA WILL SET YOU FREE."

**THAT'S HOW CEO ALAN MULALLY** has launched many a meeting since his 2007 arrival at what was then the sinking ship called Ford Motor Co.

Six years later, Mulally's opening line has become the automaker's bona fide company mantra. Bearing good news or bad, Ford managers wouldn't dream of coming to a meeting without hard metrics in hand.

"Historically, you didn't want to share bad news at Ford," says John Ginder, manager of system analytics and environmental sciences and a 22-year Ford veteran. "What Alan brought

KEITH TOLMAN

» Members of Ford's analytics team (clockwise from front left): Mike Cavaretta, Timothy Wallington, Erica Klampfl, John Ginder, Bryan Goodman and Mike Tinskey.

# COVERING *all* BETS

**LIKE ALL automakers, Ford wants to make the best choices when picking the next new vehicle and fuel technologies. Its future depends on it.**

**Data analytics is playing a central role in that process.**

**Ford has partnered with researchers at Chalmers University of Technology in Sweden to develop a global energy model to help decision-makers understand global energy supply and demand and how to meet its needs at a minimal cost and in a sustainable way.**

**"The model looks 100 years into the future and can be used to address what-if questions, such as, 'If we had a carbon dioxide emission target of *x*, what would that mean for autos, trains and planes?'" says senior technical leader Tim Wallington, who heads the Ford analytics team focused on sustainability issues.**

**"There is a wide range of vehicle fuel technologies in the future, and what we did in the model is include our best estimates of the current and likely efficiency of those technologies and a range of costs associated with them," Wallington explains.**

**For example, "when looking at electric vehicles, we know what they cost now, but how much they'll cost in the future we don't know," he says. "We feel confident that the cost of batteries will decline, but we don't know by how much, so we include in the model a number of different takes."**

**By manipulating various what-if factors, including emission targets, fuel types and costs, Ford researchers ultimately came to the conclusion that, for now, "there is no silver bullet," Wallington says. In other words, no single technology is the correct choice for the vehicle of the future, which is why Ford has adopted a portfolio strategy to developing sustainable technologies and fuel options.**

**"We did thousands of scenarios, and the bottom line is that given the uncertainties in future costs and efficiencies, it's not possible to pick a winner," Wallington says. "Customers can vote with their money as to which they want and which one wins the future. This is the high-level strategy."**

**The upshot is that Ford is making a range of vehicles with alternative fuel options. These include cars with advanced diesel engines, hybrids, plug-in hybrids, all-electric vehicles and alternative fuel vehicles. The company uses the catchphrase "the power of choice" to market that strategy.**

**Some of Ford's competitors, meanwhile, are focusing on battery-powered and electric vehicles. "Others have put more of their eggs in a single basket," says John Ginder, manager of system analytics and environmental science at Ford. "In the first decades of this century, [other automakers] spent a lot on fuel cell vehicles. They were very bullish on them. We are intrigued by them, but we also have a prudent risk management." That approach, says Ginder, is solidly based on analytics.**

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to the company is a mindset that we would no longer operate on anecdotal evidence. I've seen that explode in the past five or six years. Our CFO and COO are huge proponents. Today, it's all about having a data-driven perspective."

Indeed, data and analytics permeate every business move that Ford makes, from forecasting the price of commodities to figuring out what consumers want, what the company will build, where it should source parts and how to power its lineup of cars and trucks.

Crunching data behind the scenes are some 200 big data and analytics experts from a broad spectrum of disciplines. They work in what Ford calls analytics centers of excellence, which are found in various units of the $134 billion company, including marketing, research, credit services and others.

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Since 2007, these analytics experts have contributed mightily to urgent strategic and tactical turnaround decisions, working on projects that ultimately decided issues such as which brands and models to discontinue, where to procure parts and materials, and how to enable dealers to tweak their inventories to improve sales.

Quarterly financial figures, Ford's stock performance and the company's most recent annual report tell the rest of the story so far. In 2009 — one year after reporting a record $4.6 billion loss — Ford posted a profit for the first time in four years. That same year, it launched 25 new vehicle lines and sold 2.3 million cars and trucks in the U.S., becoming the first brand to top the 2 million mark in U.S. sales since 2007. In October, the automaker reported its 17th consecutive profitable quarter.

Data analytics is a key competitive tool for all carmakers, which are slicing and dicing data on customers, production, vehicles and more to predict demand and hone their product offerings. General Motors, for example, has been collecting vehicle diagnostic data and other information via its OnStar system for years. But Ford is heavily focusing its analytic efforts on customer preferences, an area where it appears to be ahead of its competitors, according to Thilo Koslowski, an automotive analyst at Gartner.

"Everyone is working on [analytics] and to varying degrees have [gained] insights with regard to product usage," he says. "I see Ford having explored this sooner than others, especially in terms of understanding customer preferences."

At Ford, "there was very much a sense of urgency, and that tends to drive people to think outside of the box," says Ginder. "There's nothing like a crisis to help get the type of acceptance that's important [with analytics]. The crisis of 2007 and 2008 was a major turning point for our company and the role that analytics can play. With that combination of crisis, new management and a new perspective, we were emboldened and empowered to look at things quite differently."

Ford has derived some of the greatest returns from analytics investments focused on three areas: ascertaining what customers want, managing vehicle complexity and delivering to individual dealerships the right cars with precisely the right features that customers in that particular geographic area want to buy.

## The Right Car to the Right Dealer

For decades, Ford, like all automakers, has relied on extensive market research, surveys and focus groups to get a grip on the heart's desires of drivers.

"But that doesn't always give us a complete picture because that data needs to be standardized in order to do comparisons," says Mike Cavaretta, project leader in predictive analytics at Ford. One way the company is addressing the issue is by monitoring social media for more specific intelligence and customer feedback.

"The nice thing about social media is that people elaborate," Cavaretta says. "They talk about more things and go beyond whether something is simply cool or not."

For example, when Ford was monitoring social media streams to learn how people felt about its three-blink option for signaling a lane change, the company learned a lot more about turn signals than it set out to know. "We found that in some vehicle lines the turn signal wasn't high enough or [was] in the wrong place. The problems people talked about weren't with the three blinks, but other aspects," Cavaretta notes. Ford was able to incorporate such feedback into decisions about new products and features.

Building in the features that drivers want is one thing. But ensuring that dealers have those cars on hand to sell is absolutely critical to turning a profit. "Quite a few customers walk into a dealership and want to leave with a vehicle that day, so we're limited to vehicles on hand that day," explains Ford research scientist Bryan Goodman, who works on analytic systems that support sales and marketing and their intersection with materials planning and logistics. "We have to get the right vehicle with the right engine and right set of features and controls to the right dealerships."

## Merging Data Lanes

To do that, Ford integrates and analyzes several data streams, including data on what it has already built and sold, data on what has sold in the context of what was available in inventory at the time of the sale, plus data on what customers are searching for and configuring on company websites. This data is then combined with economic data to predict vehicle sales relative to housing starts, employment rates and other information. The system is known as the Smart Inventory Management System, or SIMS.

"We largely figured things out over various experiments and applications in this area over many years, but much of it was not enabled until the last few years because of the increase in computational power," Goodman says. "We have 20,000 compute cores in the building next door at our disposal. We have computers with 1.5TB of RAM. It's those sorts of resources that have enabled us to synthesize this kind of data."

All around, SIMS is acknowledged as a pivotal factor in Ford's turnaround and the overall success of Mulally's global "One Ford" strategy.

"As we globalize and leverage products from around the world, it means new complexity management challenges," says Goodman. Before, "if any feature was desired in any market, we'd engineer it and make it available. When you get into different roof heights, different interiors, different wheels and so on, we can offer an astronomically large number of combinations. Imagine 300 billion and then multiply it by itself again. Customers get overwhelmed by too many choices." Instead, Goodman says, "we want to match customers' wants with our global supply chain. It's a challenge throughout the industry, but there's huge value in getting it right." This requires knowing customers' key preferences, then tailoring the bulk of the company's production to those preferences, rather than building a very wide range of models with many combinations of features. It comes down to building cars that most customers want most of the time.

This is where SIMS has really paid off. Assembly plant schedules and parts forecasts have both significantly improved because "we can run those schedules with better algorithms," says Goodman. "In 2007, we could do it but it would take two to three weeks, and assemblers needed answers in 20 minutes or less. Today, we can do it in two minutes."

Ford dealerships, which are independent franchises, also have benefitted. Some 3,500 dealerships receive the weekly reports. Those that subscribe to SIMS recommendations say that they are selling cars at higher prices and more quickly, says Ginder.

## Down the Road

Yet Ford's analytics experts say they have only just begun to scratch the surface with big data. The next big frontier is data that streams from vehicles themselves.

"The volume of data generated by vehicles is huge," says Ginder. Ford's Fusion Energi plug-in hybrid car gets the equivalent of 108 miles per gallon. It also generates 25GB of data per hour.

Ford currently offers three kinds of hybrid cars: two plug-in models and one electric model. All are equipped with an embedded modem that customers can enable on an opt-in basis to stream data about vehicle performance back to the manufacturer.

"We gather data every time the customer plugs in. We know where they're plugging in, how many gas miles they drove, how many electric miles, how often they plug in and how often they take trips. It's helping to shape where we go next with products," says Mike Tinskey, director of vehicle electrification and infrastructure. Still, "our big data [from vehicles] is relative for now. It's small but growing," he says.

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at how it relates to our internal business processes." When integrated, the data creates a veritable heat map of where improvements need to be made.

Ford also provides reports back to the drivers. "We're taking the big data and processing it for all stakeholders as a monthly report," Tinskey says, noting that customers receive a link to a customized monthly report detailing their usage and vehicle performance.

### Intersecting the Internet of Things

Tinskey, Cavaretta and others on Ford's analytics team anticipate that, increasingly, vehicle data will be combined with other types of internal and external data via the Internet of Things. That could enable customers to do things like tune their cars' engines to individual specifications and pay discounted rates for the electricity they use to recharge, depending on the time of day or night that they drive and/or recharge their vehicles.

"The really cool thing is we know where these customers are charging and we know what electricity generation looks like in their ZIP codes. We have a grid generation database of all the ZIP codes in the United States, and we tie that data together with charging data," explains Tinskey.

"What we're proposing is that as we reach critical mass, vehicles could respond to calls from the utility to scale back [consumption]. One scenario is that customers would delay charging their cars when power demand is high and the utility would compensate them by charging them a lower rate," he says. The scenario is similar to programs already in place for heating and cooling homes. Tinskey notes, for example, that his home air conditioner is on a separate meter "and I enjoy lower rates whenever I use it in exchange for turning it off or down during certain hours when the utility calls for that."

The Internet of Things enables the combination of internal, external and vehicle data to provide new services, says Cavaretta.

"It could be that the vehicle is a mobile sensor platform connected to sensors in the road or in streetlights to monitor traffic conditions, weather conditions and energy usage. It could then communicate information to the vehicle and change the vehicle's behavior. The ability to take information embedded in sensors in the environment and then better understand how to modify the vehicle or optimize business processes is the real key," he says.

The bottom line: Big data is only going to get bigger at Ford, which has clearly tied its future to the power of analytics. ◆

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> **BRYAN GOODMAN,**
> RESEARCH SCIENTIST, FORD

# TRANSLATING BUSINESS NEEDS *to* MATHEMATICAL LANGUAGE

As John Ginder sees it, the best data scientists possess a combination of mathematical expertise, familiarity with computer science and programming applications, and the ability to translate business needs into mathematical language. Usually, Ginder can find people skilled in one or two of those areas. "But it's hard to find all three traits in one person," he says.

Ginder, an early proponent of analytics at Ford, is a physicist by training. As it turns out, so are many of the automaker's other 200 or so data scientists.

"I personally look for people who can adapt and reinvent themselves on a regular basis," Ginder says. "We have physicists, chemists, applied mathematicians and research specialists. Physicists are a good source because they have a certain mindset on how to approach problems. But we also want people with MBAs and engineers."

Ford's data scientists are assigned to so-called centers of excellence associated with different departments, such as marketing and research. They work on both strategic and tactical issues, ranging from which models of cars to produce to where to source materials and where to build certain vehicles.

The key to a successful project is the stability of the data, Ginder says.

"I'm always looking for a stable source of data and looking to what degree we can expect to continue to have that data," he says. "My contention is if there's not a guarantee we'll have access to that data in an ongoing fashion, we don't want to develop an application around it."

Over the past decade and a half, Ford's centers of excellence have developed successful relationships with the company's IT department. But it wasn't always that way.

"Fifteen years ago, IT was largely the organization we had to go to for access to data from transactions. They were the source of data and we were a source of headaches because we were developing what they considered shadow IT," Ginder recalls.

That began to change when Ginder's team was working on SIMS, the Smart Inventory Management System. "We started to understand some of the constraints of the IT organization and understand their practices in terms of how applications were developed," Ginder says. "They were following a traditional waterfall process, which we in research thought was ineffective."

Today, as a result of working with the analytics team on SIMS, "our IT application development organization has moved almost entirely to agile practices," Ginder says.

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Here's how to determine if your organization needs the security, control and performance that a private cloud offers. **BY NANCY GOHRING**

# When to Pick a PRIVATE CLOUD

**PRIVATE CLOUDS** are all the buzz these days, so you'd be forgiven for thinking that everybody's doing it. But in fact, fewer companies than you might think have deployed "true" private clouds.

Forrester Research found in a recent survey of 2,330 people that 26% of IT executives say they have a private cloud. But among those who claimed they have a private cloud, only 13% implemented the technologies that Forrester says truly define a private cloud, like self-service and automated provisioning, among other features. Instead, those companies built private environments that have some, but not all, of the features of a private cloud.

THINKSTOCK

Further, some businesses that are building private clouds would really be better off with standard virtualized data centers or with public cloud services, experts say. About half the time, businesses build private clouds for the wrong reasons and should be doing something else instead, estimates David Linthicum, a consultant at Cloud Technology Partners.

"In many instances, I'll determine quickly that it's an emotional decision versus a logical one," he says. For example, some IT departments are so used to running their own data centers that they have a hard time letting go, so they set up private clouds — and in some of those cases, they do that because they're concerned about how a shift might affect IT jobs.

That doesn't mean there isn't a need for private clouds. There is — under the right circumstances, which may involve big new development operations, apps that draw on truly sensitive data, or aging data centers.

## The Rationale

The first question a business should ask itself is why it wants to build a private cloud. Typically, enterprises talk about security, Linthicum says. But that's not the whole story. "The reality is, it's control. They want the thing to exist in their data center. It's just hard to change habits," he says.

Mike Schutz, general manager of product marketing for Windows Server and Management at Microsoft, agrees that control is an issue. "In some cases, what the public cloud doesn't provide today is a level of control that some organizations need," he says.

It's not just the ability to reach out and touch the servers. With a private cloud, a business can build just the amount of memory and storage it wants and make its own choices on software for databases and other systems, for instance. Organizations can also customize security to fit their needs and use the networking gear that ensures fastest connections to their data.

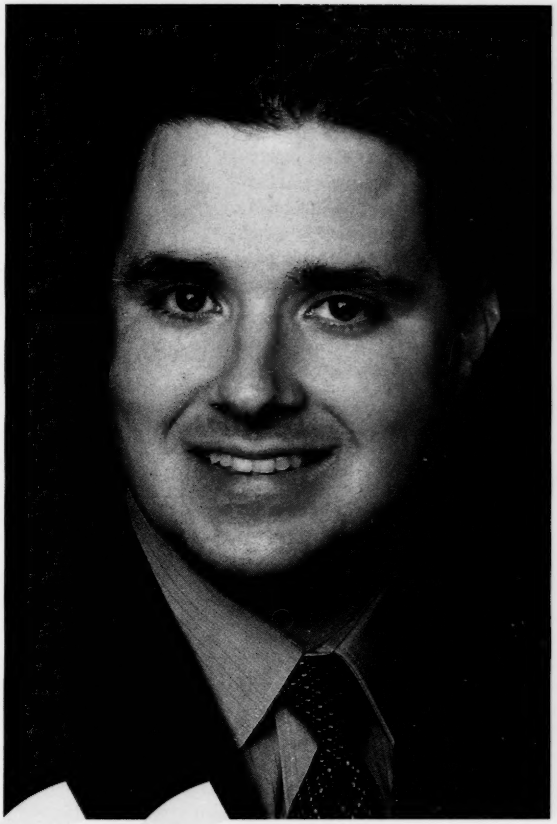
A need for security can be a good reason to use private cloud, Linthicum says. For example, a private cloud may make sense for businesses or other organizations that handle state secrets, personally identifiable information or proprietary research.

Heartland Payment Systems, which offers payment processing services to merchants, falls squarely in the category of a business that turned to a private cloud for security reasons. In 2010, it embarked on a data center consolidation project, just a year after experiencing a well-publicized data breach. "Security and risk and compliance and liability were all top of mind," says Kris Herrin, CTO at Heartland.

As part of that data center consolidation process, which whittled the number of data centers from nine to three, Heartland decided to adopt a private cloud. And having been an early adopter of private cloud technology, the company is now in the unique position of upgrading to a second-generation private cloud.

"Our first attempt was very much 'cloud washing,'" says Herrin, meaning that the vendor, Fujitsu, took advantage of the buzz around the term "cloud computing" and called the setup a cloud without actually delivering full cloud features. "It was an outsourced managed service offering that was simply whitewashed with cloud-like behaviors, including utility pricing."

That said, Heartland's private cloud continues to serve its purpose — running the payment processing service used by Heartland's merchant customers. The infrastructure is owned by Heartland and is in a physically separate environment, but "our auditors, internal and external, can see and feel and touch it, and that makes them feel better," Herrin says.



**Our auditors, internal and external, can see and feel and touch [the private cloud], and that makes them feel better.**

**KRIS HERRIN,** CTO,
HEARTLAND PAYMENT SYSTEMS

But it's missing a few key features. One is that it doesn't offer software-driven networking or storage. That means Heartland can easily and quickly provision compute power, but it might take an additional two months to set up the networking piece.

Heartland has a complex network design because of the nature of its business — it offers real-time credit card processing services.

Its second-generation private cloud, which it hopes to have up and running by the first quarter of next year, will support software-defined networking, which will decouple the networking from the compute functions and should thereby make it easier to provision cloud services and make hardware upgrades.

Heartland currently uses VMware's cloud technology and

## Defining a Private Cloud

THE NATIONAL INSTITUTE of Standards and Technology's definition of a "true" cloud environment includes the following characteristics:

- On-demand self-service.
- Broad network access.
- Resource pooling.
- Ability to scale resources quickly, either up or down.
- Measured service.

A key feature of clouds is orchestration – the coordinated delivery of many types of resources including processors, storage and networks – to provide an integrated provisioning process. In other words, a single command or request causes a number of actions to occur, in a specific sequence, to coordinate the provisioning request.

The whole point of a private cloud is to allow IT managers to reduce costs and provide agile provisioning rather than just making management of the infrastructure more convenient for themselves or others.

– NANCY GOHRING

expects to continue with VMware in its new cloud, at least initially. "We're having open discussions as to whether we may or may not continue with [VMware] in the long run," Herrin says. "We realized we need to give ourselves the ability to be agnostic, whether we stick with VMware or not." The plan is to architect the cloud so that the company can switch to a different cloud technology provider in the future. Apache's CloudStack is on Heartland's short list, he says.

Heartland expects to be able to use existing server hardware from IBM for the new cloud, and it's evaluating whether it will be able to reuse the Fujitsu hardware from its first-generation service.

The new cloud likely won't be self-service in exactly the same way that public clouds are, but Herrin still expects it will be a dramatic improvement. "What I figured out quickly is my business users and developers internally didn't really care about self-service," he says. Whether they ordered up the resources themselves or someone else did it for them, that factor wasn't as important as getting access to the resources quickly.

He envisions a setup where developers will be able to do most of the provisioning they want on their own while reaching out to a staff cloud expert for some functions. "Given where things are today, in that it takes weeks to get things done, getting it down to days — people will be thrilled with that," he says.

Heartland does use public cloud services, like those from Amazon Web Services, for some applications. "We want to consume more and more in the public cloud, but we know we will always still have a private cloud," Herrin says.

### Purpose-built Private Clouds

SunTrust bank is another institution whose security needs spurred it in the direction of private cloud, but it's taking a unique path. "Our longer-term strategy around cloud computing is this: We are building a series of private, internally hosted clouds that are very much purpose-driven," says Rich Gilbert, senior vice president for information technology and services at SunTrust.

In other words, the company is building separate clouds geared specifically toward their applications. For instance, it's currently working on a cloud that will support its virtual desktop infrastructure. "VDI apps are very I/O intensive," Gilbert says. "So instead of using a general cloud, we'll build it specially to support that workload."

SunTrust is also building a test and development cloud that will be designed as a more all-purpose cloud with a self-service capability. That cloud will have an equal mix of VMware and Microsoft cloud software.

The bank regards its private clouds as an interim step. Once the company is running applications on its private clouds, it hopes to evaluate whether one day it might be better to offload them into a software-as-a-service or externally hosted private environment. "The longer-term challenge is . . . how do we become more of a service broker than a service builder?" Gilbert says.

The bank has taken steps in that direction with its archiving system. Around 18 months ago it started evaluating options for document and email archiving and retention. Using an external private cloud for archiving turned out to be a better bet than building in-house, Gilbert explains. When looking at the value add of archiving in-house, including building the service and ongoing support, it made more sense to use the external service, he says. The service is hosted by Viewpointe.

### Performance as Motivator

In addition to security concerns, a need for systems that deliver very high performance can be a reason for building a private cloud.

Nokia Research Center and Nokia Solutions and Networks — two separate companies — both built private clouds for security and performance reasons.

For Nokia Research, neither a public cloud nor the corporate production network was a viable option. Nokia Research computing resources are used by researchers who are toying with new projects, and it would be too risky to run such systems on the corporate network, where they could potentially cause trouble, says Alex Bederov, systems architect at Nokia Research.

And because the projects are confidential, "legal just wouldn't allow us" to use a public cloud, he explains.

Nokia Solutions and Networks (NSN), which has an annual R&D budget of 1.7 billion euros, had similar needs, with a twist.

It had a VMware-based data center, used by researchers, that had performance problems and therefore was running some workloads without virtualization. So the company began looking for a way to both homogenize its environment and introduce more flexibility for researchers, says Janne Heino, product manager of cloud solutions R&D at NSN.

"The challenge for a company like ours is that we have a lot of data internally in place," he says. If the company had gone with a public cloud, moving that amount of data to the cloud and back on a regular basis "would have been quite a challenge."

NSN considered sticking with VMware, but at the time — about three years ago — that option wouldn't allow it to let users instantly spin up new instances.

It looked into Eucalyptus, Nebula and OpenStack and settled on Eucalyptus, because it was the only one with a production product at the time. "OpenStack came as a compiler and source code," Heino says. With Eucalyptus, he figured there'd be someone to call for help if needed.

NSN now runs a private cloud that currently has 10,000 cores spread across four locations worldwide and is growing, seemingly by the day. "It's been quite a success. It's scary at times," Heino says.

In terms of instance hours used, the cloud has been growing 35% a month for 15 months. "I love it and hate it," Heino says. "Every month I think, 'Where do I grow next?' I hope it ends soon, otherwise I'll run out of server rooms."

Unlike many of the businesses in the Forrester study mentioned at the outset, Nokia Research and NSN take full advantage of self-service options.

In fact, that was one of the primary reasons Nokia Research built its private cloud.

"You can call [the private cloud] whatever you want to call it. I'm looking at it as automation of resource provisioning," Bederov says.

Managing resources for Nokia Research has been an evolution, he adds. "First it took six weeks to get a server on the network, then 24 hours. Now it's two minutes," he says.

## The Quota System

NSN also offers self-service and uses the tools Eucalyptus offers to set quotas for users. Some workers who "will need a lot of resources and are responsible have access to anything," Heino says. Others have limits.

Deciding who needs a quota and what size it should be is a challenge, he warns. "Writing quotas is difficult. We don't want to limit innovation or development," he says. He's currently researching ways to implement more advanced resource management. For instance, he'd like to offer key users a guaranteed amount of capacity but have the ability to offer that capacity to other developers if it's not being used. He's investigating using one of Netflix's open-source tools, Janitor Monkey, to help with that.

Xerox, which has built a private cloud in India based on Microsoft's technologies, also controls the resources users can access. Because several different groups use the cloud, Xerox also uses Microsoft tools for internal billing and chargeback, says Raman Padmanabhan, senior vice president and CIO of Xerox Business Services.

Nokia Research, NSN and Xerox are outside the norm. While some businesses buy private cloud products but don't turn on critical features because they aren't quite ready yet, most avoid self-service for a reason.

"Typically, it's a lack of trust," says Lauren Nelson, an analyst at Forrester. IT managers worry that if they turn on cloud capabilities, like self-service, internal users will do things incorrectly, she says.

In many cases, though, it's just a matter of time, says Mike Adams, group product marketing manager at VMware. "In the enterprise, you may be dealing with a more conservative crowd that may turn [features] on over a longer period of time," he says.

Also, some IT admins figure that the upgraded products, even without self-service and some of the other capabilities, are good enough. Where it used to take them two weeks to provision resources, the new management interface lets them respond to a ticket in two days.

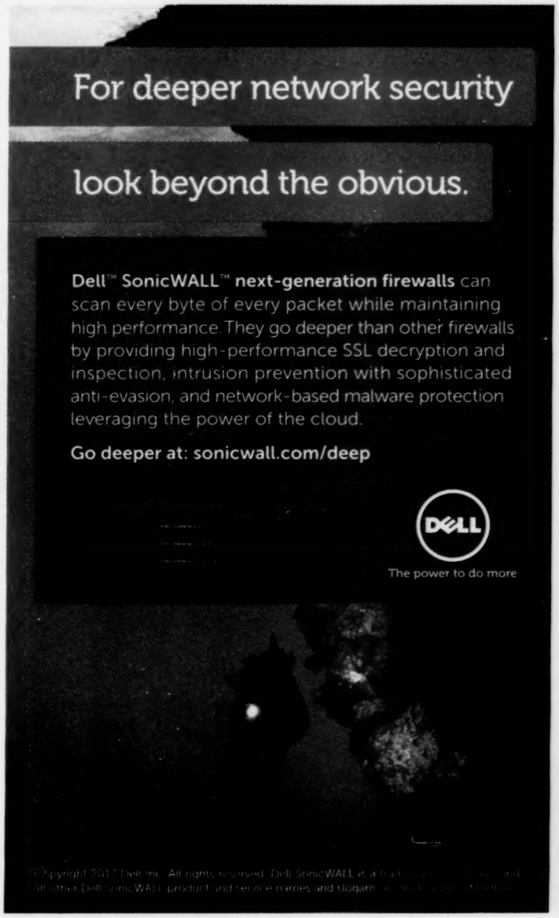
"They don't think users need 15 minutes," Nelson says. "They think two days is substantially better than the status quo."

But that avoidance might come back to haunt IT: Given that developers know that they can spin up an Amazon Web Services instance in 15 minutes, IT may be essentially driving them to do so, even if it's against company policy.

Wherever you are in your private-cloud journey, Cloud Technology Partners' Linthicum suggests looking at all options: The traditional enterprise vendors — and not just the one you're already using — as well as the upstart technologies.

With all the new choices, industry watchers say, it's clear that the competitive landscape is changing. ◆

**Gohring** *is a freelance writer who covering cloud computing, mobile phones and wireless networks. Follow her on Twitter (@ngohring) and contact her at ng@ngohring.com.*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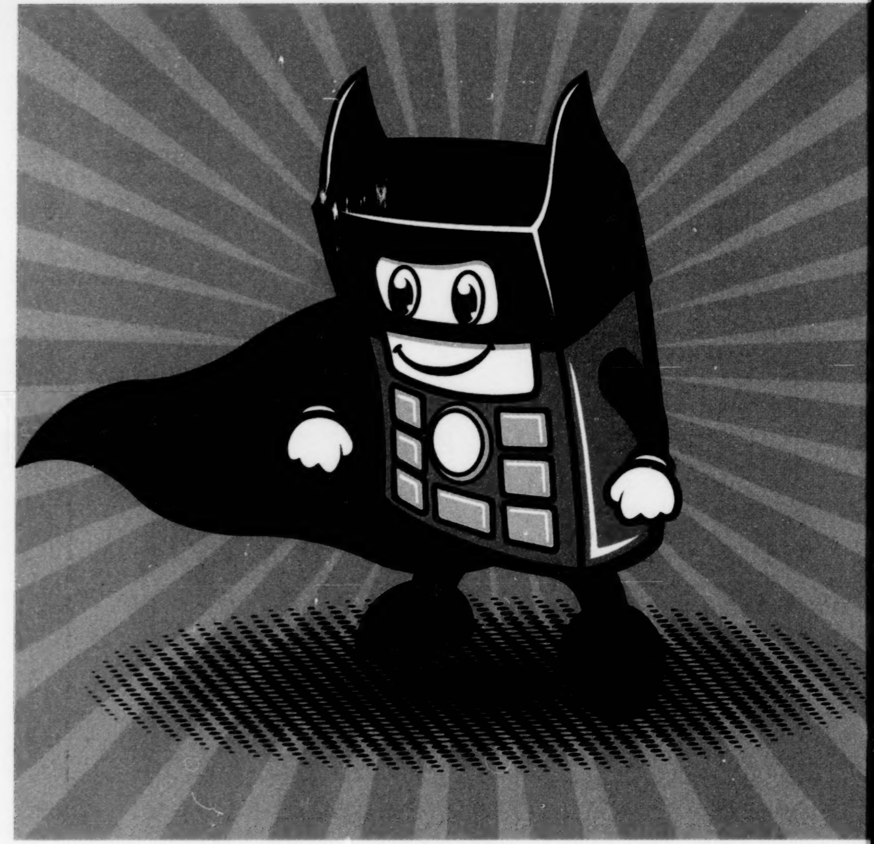


# Who Owns Mobility?

Mobility touches multiple facets of IT — platform choice, application development, customer engagement. **Does it make sense to put one person in charge of it all?**

BY HOWARD BALDWIN

**ON THIS WE CAN AGREE:** Mobility is a matrix of madness for enterprise IT.

The current explosion of tablet, smartphone, netbook and laptop options creates a complicated hardware equation. Cross-platform or OS-specific application development affects software, security and management decisions. The desire to give both customers and employees access to back-end enterprise applications is just one more monkey wrench.

THINKSTOCK

"Mobile is changing all the rules, whether you're on the IT side or the line-of-business side," says Bob Egan, CEO of Sepharim Group, a Boston-based mobility consulting firm. "We've gone from a homogeneous environment to a heterogeneous environment with multiple screens and operating systems. It's a capacity issue, a security and authentication issue, and a policy issue. It's a brave new world for organizations to deal with."

So how do you manage the madness? Should you, for example, hire a mobile wrangler to corral efforts, and make him or her the arbiter of interfaces and back-end architecture access, as Case Western Reserve University has done? And if you do, to whom should that person report? Or should you create a separate, ad hoc group to get your company quickly and creatively up to speed on mobility, as gaming company Electronic Arts did? If so, should those responsibilities eventually roll back into IT? Or should you establish a group that functions as a center of excellence for mobile, as Needham Bank has done? If that's viable, then how should it be staffed and who should oversee it?

While there is no one right answer, IT managers and analysts agree the stakes are high. Mobility is no longer tactical, it's strategic, and therefore requires a higher level of consideration. "It went from being nice to have — something that executives and users really loved — to being a mainstream initiative," says Ojas Rege, vice president of strategy for MobileIron, a vendor of mobile enterprise management systems.

> **[Companies] wind up duplicating a lot of [mobile] efforts because the right hand doesn't know what the left hand is doing.**
>
> DAVID NICHOLS,
> IT TRANSFORMATION LEADER, EY

### A Big Ball of Wax

Before you can corral mobile, you need to figure out who or what group should do the corralling. But even that decision isn't easy to make.

Take the issue of support. Mobility is not solely a hardware issue, so it doesn't necessarily make sense to drop it in the desktop team's lap. "In the tablet world, IT can't push [just] Apple iOS," says Rege. "It's not technically possible."

And it doesn't make sense to put the email team in charge of mobility, because mobile devices are used for much more than email these days — you have to take into account security, device management and more. Beyond that, it's one thing to offer technical support to your company's employees; it's another to offer the same kind of support to the exponentially larger customer base you're trying to engage.

Then there's the age-old schism between marketing and IT. As Egan points out, "marketing's first responsibility is to drive the persona of the brand through all channels and geographies. IT's responsibility is to protect the brand, not extend it. Its goal is to protect profits, not drive revenue."

When it comes to mobility, customer-facing applications are generally managed by the sales and marketing teams, and employee-facing applications are generally managed by IT. The people in sales and marketing want applications up and running quickly so the company can keep abreast of the competition; when they think about deployment schedules, they think in terms of weeks. The folks in IT, on the other hand, want to ensure consistency across access methods and within the code base, so they think about deployment schedules in terms of months. Moreover, marketing might have the budget to do mobile applications, and IT might not.

But those two groups need to collaborate to ensure that applications work consistently, both within the user interface and in how they access back-end applications.

The challenge is rationalizing the conflicting demands of timetable, budget and focus. "Organizations that are doing it right are getting both IT and marketing to realize they both simultaneously share responsibility for the needs of employees and consumers," says Egan. "They both have to drive revenues and extend profits. That's new thinking for most organizations."

### Avoiding Help Desk Hell

Even if specific lines of business have their own development efforts, they must have a liaison into IT for a variety of reasons. Among other things, it makes sense to coordinate the efforts of multiple departments on the front end, and when it comes to technical support.

The alternative is help desk hell. "When someone has a problem with a mobile application, they call the help desk," says Rege. "If you have 17 different groups building applications, that's going to be an existential crisis for all the teams."

Rege cites several simple examples. One relates to Apple iOS's security APIs, which provide automated encryption. "If the line of business hires outside developers, they might not use those APIs," he says. "The same issue applies with application distribution. If someone in the line of business builds an application, how are they going to get it to the employees? Through the [company's] app store — but IT has to provide the certification for those applications to download properly."

David Nichols, IT transformation leader for consulting firm EY (formerly Ernst & Young), frequently sees duplicate development efforts within a single enterprise. "As far as ownership [of mobility] goes, it's still more bifurcated than you would think in companies that have internal back-office operations and client-facing technology as well. Those are owned, managed and governed by two different organizations that don't always move at the same speed. They wind up duplicating a lot of efforts because the right hand doesn't know what the left hand is doing."

Experts agree that companies need to put in place a mobile model that encapsulates best practices and consistent capabilities — but no one agrees (yet, anyway) on exactly how to get there.

We asked three companies how they handle mobility management and found that each takes a different approach. Here's a summary of each: Create a dedicated team to establish the groundwork for a cross-departmental mobility effort. Put the effort under the aegis of a dedicated mobility manager reporting to the CIO. Create a center of excellence focused on mobility that will maintain the necessary consistency from the front-end interfaces to the back-end architecture.

APPROACH 1

### Dedicated Team

Lincoln Wallen, currently CTO at DreamWorks Animation, opted for a dedicated team when he was CTO for mobile and online at game designer Electronic Arts, from 2004 to 2008.

The EA board of directors "perceived mobility as a major disruption to the games business," he says, and that led to the idea of creating a mobile business unit inside the existing major operation. The division had its own marketing, product development and general manager, who reported to the head of studios. Keeping it separate helped it flourish into a $200 million division, Wallen says.

After the group established itself, EA — as it had planned at the outset — "integrated its activity back into the business, because mobility is foundational, not siloed," he says. "It affects every aspect of the business. You need a vertical approach to incubate approaches and solutions. But in the end, you have to consider it pervasive. Mobility is no longer evolutionary. It's the world we live in."

MobileIron's Rege has also seen this tactic work. One of his company's customers is a Global 2000 manufacturer based in Europe. "The CEO believes in mobile, so he created a five-person mobile team reporting directly to him with accountability for all mobile projects. Sometimes to get the effort kicked off, you need to do that," Rege says. The company's CIO provides the budget, and the group is still working separately.

> “When everybody has an agreed-upon set of requirements for an application ... you get away from finger-pointing.
>
> BOB EGAN,
> CEO, SEPHARIM GROUP

APPROACH 2

### Dedicated Mobility Manager

As mobile strategies gain importance, the idea of a chief mobility officer, on equal footing with the CIO and reporting to the CEO, is gaining traction in some circles.

However, IT executives we spoke to weren't fans of a CMO position, reasoning that strategic issues such as mobility are the CIO's job. "You obviously have to have somebody, but if you name a chief mobility officer, you're saying they're at the same level as the chief information officer," says Wallen.

EY's Nichols has seen companies putting mobility under the aegis of the CTO, who in turn reports to the CIO. "The CTO has responsibilities for research and development of client-facing technologies for many companies, and companies are relying on that position to get across the chasm of duplication," says Nichols. "They rely on the CTO to bring the best thinking from one group to the other."

Mark Henderson, chief operations officer at Case Western Reserve University in Cleveland, uses that tactic. "We've been dealing with device issues forever, because all of our students come with their own mobile devices, as does the faculty." Besides supporting a bring-your-own-device environment, his 110-member IT department has deployed two separate wireless networks, one requiring authentication and one for guests, and it's looking at developing more mobile applications for both students and administrators. "The university's marketing communications department wants a mobile app to communicate better, and we want to give the students the ability to access registration [databases] and their grades," he says.

APPROACH 3

### Center of Excellence

Even more than creating a position dedicated to mobility management, though, Nichols prefers setting up a mobile center of excellence, or a shared services center under the CIO. "If you do it right, you can bundle development, creativity and strategy," he says. "It will take some time to codify issues such as back-end access, identity and access management, but once those issues are out of the way, they don't have to be dealt with again. That helps bring the deadline expectations of external and internal groups closer together."

James Gordon, vice president of IT at Needham Bank in Needham, Mass., concurs. "When you have such a group, they think about mobility first," says Gordon, a MobileIron customer who has deployed mobile devices across all departments, and has also developed customer-facing applications for smartphones and tablets.

Needham Bank's IT team is small enough (just Gordon and four other people) that "everyone is responsible for mobility," he says. "When we originally deployed our online applications, we built them to be experienced on a laptop. Now we have to re-imagine it. We launched a new website recently, and we wanted a site that would scale down, with content still there, whether you were [looking at it] on a monitor, laptop, tablet or iPhone." Gordon's small group was able to double-down on those mobile priorities with commitment and focus, he says.

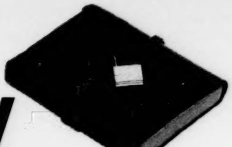
Sepharim Group's Egan also likes that setup. "When everybody has an agreed-upon set of requirements for an application, it means that everyone understands how they can achieve the goal, everyone is taking shared responsibility, and you get away from finger-pointing. Everyone has to agree on what features are important for an application."

But one caveat, according to some experts, is that a center of excellence should have influence beyond its name. "There's a right way and a wrong way to do a center of excellence," Rege says. "I've seen [situations] where no one consulted the [center] because it had more security expertise than application expertise." There has to be a balanced operational focus across multiple areas, he says.

Nichols concurs. "You have to put in the infrastructure to make sure it can be viable and successful," he says. The person in charge, in other words, has to have some influence, not just an advisory capacity. "If you don't," he adds, "the people within it will be all hat and no cattle."

Whatever path companies take to managing mobility, they can't tarry — the technology is changing too quickly. "Mobility hasn't leveled off the way the Web did after a couple of years," says Nichols. "The next two years are going to be fascinating." ◆

**Baldwin** *is a Silicon Valley-based freelance writer and frequent contributor to* Computerworld.



# Security Manager's Journal

MATHIAS THURMAN

## Trouble Ticket

» A server that contains Sarbanes-Oxley information is found to be infected by malware.

» Clean the server until it squeaks, and then get to the bottom of how that infection could have happened.

# Server Surfing Is a Big No-No

### How could a tightly restricted server in finance be compromised by malware? Really, it's not that hard.

**SECURITY INCIDENTS** are a complete disruption of my normal day-to-day activities. I love them. I especially like it when they uncover systemic problems we might not otherwise have found out about. We had one of those this week.

Our security information and event monitoring (SIEM) tool tipped us off, notifying us that malware had been detected, first on a server, and shortly thereafter on a file server. Those are not resources that should ever have occasion to be exposed to malware, and the fact that the server contained highly sensitive Sarbanes-Oxley information made the malware especially unwelcome — and surprising, since we have special networks for segmenting our SOX data.

the discussions about security! **computerworld.com/blogs/security**

### The Romanian Connection

The SIEM notification told us that some of our network traffic had attempted to communicate with a known command-and-control server in Romania. This too was odd, since Internet access from our production servers is supposed to be tightly restricted to little more than security and software update sites.

My first step, of course, was to disable the server switch port. Then I ordered an analysis of the system using EnCase, a very powerful forensics tool and a must for a security practitioner's toolbox. The forensic analysis concluded that the financial server was the point where the malware originated within our network. But how could that have happened, given the restrictions I've described? It turns out that an administrator who had logged on to the server to modify some scripts decided to launch Internet Explorer and log in to his personal webmail account. He then clicked on a phishing link, and you can imagine the rest.

We have retained a third party to analyze malware for us. Its report stated that the malware was programmed to communicate with a website in Romania over SSL (Port 443). The communication attempt that our SIEM observed was an initial check-in — a heads-up to the command-and-control server that an installation had been successful. Here we got a break, because the Romanian server seemed to be offline. In fact, a lot of the cyberworld's bad guys activate their command-and-control servers for only a very short window.

The report also said that the malware had copied itself to open network file shares. Because the server was mapped to the finance department's file share, the malware was sitting in the root directory of that share, just as our SIEM had found. The server was checked from top to bottom, and we ran additional rootkit detection software to ensure that it was clean. Not wanting to take any chances with this server, I was ready to do a complete wipe and rebuild it from backups.

In the end, that wasn't necessary. Confident that the server was clean, I needed to find out how this incident could have happened in the first place. The answer came with a review of the firewall rules for the network: There were no outbound restrictions in place. They had been in place at one time, but when we moved from an on-premises data center to a hosted facility, some of the firewall rules didn't get migrated correctly. I had the network team close off the firewall hole by restricting outbound access from this network segment to the Internet.

Just as importantly, it seems to me that any systems administrator with privileged access to a critical resource should know that personal use of that system is not a good idea. But quite often, even people in positions of responsibility need training to understand things that just seem like common sense to a security manager. I will have to send an official reminder to the IT department not to use servers for activity other than official business needs. ◆

*This week's journal is written by a real security manager,* **"Mathias Thurman,"** *whose name and employer have been disguised for obvious reasons. Contact him at mathias_thurman@yahoo.com.*

> **"An admin logged on to the server and decided to launch IE and log in to his personal webmail.**

# Career Watch

Q&A

## Kelly Walsh

*The president of personal coaching firm 1 Smart Life talks about* **work/life balance.**

**Are employers taking work/life balance issues seriously, or are they just paying lip service to the idea?** It's a mix. Some employers are doing very well. SAS Institute is well known for its family-friendly style, along with Mitre, Nestlé Purina PetCare and Facebook, to name a few. They have benefits such as on-campus daycare, personal services and fitness centers that frame the corporate culture.

Some are missing the mark. They might use the term "work/life balance" on their recruiting pages, but really just list normal benefits like time off for jury duty (really!). It's lip service when it isn't fully part of the corporate culture. A company may say it supports flexible work arrangements, but if there is no policy or promotion of the policy, managers are on their own [when it comes to addressing employees' work/life balance issues]. When that happens, people are treated differently. One boss may fail to communicate well with those not in the office. Another may offer flexibility only to mothers, alienating people with other life concerns (45% of men are now reporting work/life conflicts).

**Do you find companies doing things in the name of work/life balance that are actually counterproductive?** Yes! Some companies offer things that they think will appeal to employees, such as pool tables, free snacks and soda or, even more surprising, beer after 5 p.m. The intention is probably good, but there are many unintended consequences. First, people from these environments whom I have interviewed say that these perks do nothing to shorten the workday or reduce stress. The workload is still tremendous, and free chips don't fix that problem. Also, employees have gained weight, because when they are under stress, they reach for the free cookies, not the free apples. In addition, they notice a "frat party" atmosphere when the beer comes out, including sexual harassment.

People need individualized work/life solutions that will work for them as their life changes. Perks like free soda don't hit the mark, although many companies try them, and new hires are likely to tell their friends first of all about these kinds of things.

**What evidence is there that legitimate efforts to provide work/life balance are good for a company's bottom line?** Glassdoor took a look at the top 25 companies to work for, as ranked by US News & World Report, and found that companies with the best work/life balance programs have the best retention. That is a huge benefit to the bottom line. Most studies put the cost to replace an employee at 200% of the employee's current salary. (The American Management Association estimates a range from 25% to 500% of an employee's salary. Quite a range, but I've been seeking this data out for years, and 200% is the most common number in studies.)

According to the U.S. President's Study of American Work-Life Balance, from March 2010, work/life balance programs "can reduce turnover and improve recruitment, increasing the productivity of an employer's workforce. These practices are also associated with improved employee health and decreased absenteeism, a major cost for employers."

– JAMIE ECKLE

# Auto-Networking

**LINKEDIN IS MAKING NETWORKING something your phone just does for you.**

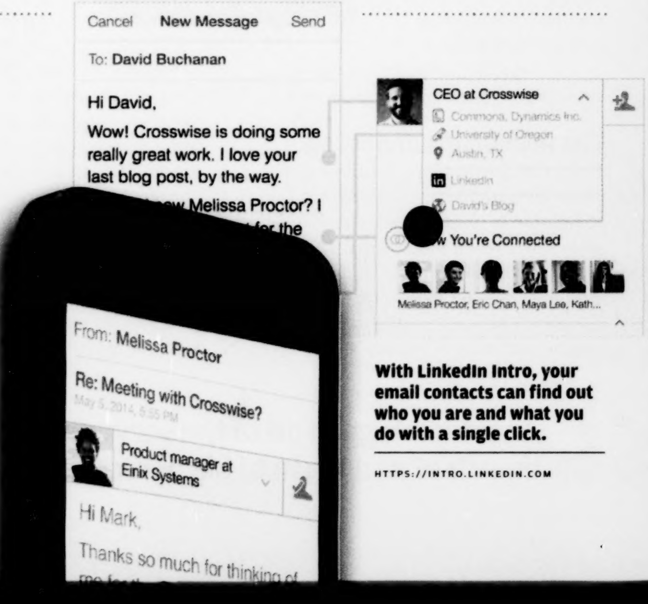
In October, the company announced LinkedIn Intro, which is designed to incorporate some of the professional networking service's key functions into users' regular email on their iPhones.

With LinkedIn Intro installed, certain information from email senders, like where they work, previous jobs and where they went to school, will appear in email messages. Users can click on a sender's name and see all the information without leaving the email. There's also a button to connect with senders.

The service is available for the iPhone's mail application, and it supports these email services: Gmail, Yahoo Mail, AOL Mail, iCloud and Google Apps.

The company didn't reveal plans to offer versions of LinkedIn Intro for other mobile operating systems.

– ZACH MINERS, IDG NEWS SERVICE



To: David Buchanan

Hi David,

Wow! Crosswise is doing some really great work. I love your last blog post, by the way.

Melissa Proctor? I

for the

CEO at Crosswise

Commona, Dynamics Inc.

University of Oregon

Austin, TX

Melissa Proctor, Eric Chan, Maya Lee, Kath...

From: Melissa Proctor

Re: Meeting with Crosswise?

May 5, 2014, 5:55 PM

Product manager at Einix Systems

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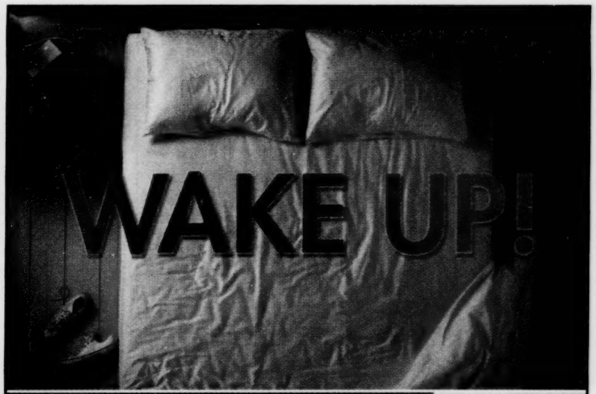

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Industrial Designer (Mountain View, CA) **#1615.1038**; Create physical industrial design for Google products and features. Exp incl: industrial prod design; consumer electronics design; soft-goods design, wearables design, packaging & point of sale; manufacture processes; low fidelity & high fidelity prototype creation; consumer electronics & soft goods physical models creation for manufacturing; creating & communicating industrial designs using 2D Design tools; & creating & communicating industrial designs using 3D Design tools. Intl trvl req'd.

Test Engineer (Mountain View, CA) **#1615.3483**; Design, develop, modify, and/or test software needed for various Google projects. Exp incl: OOP; Unix, Linux, & Shell Script; Selenium or WebDriver; Espresso or UiAutomator; design of test strategies & test plans for new prod features; mobile oper syst & lower lvl embed syst; mobile release process; & test automation in mobile or web environ.

Software Engineer Positions (Mountain View, CA) Design, develop, modify, and/or test software needed for various Google projects. Exp. incl:

**#1615.238**; C++; Java; mach learn, nat lang process, & stats; distrib storage syst; & distrib algorithms & data process.

**#1615.5714**; C++; Python; SQL; Linux script; OOD; mach learn; large-scale data process & syst design; data mining; & distrib computing.

**#1615.3928**; scalability; distrib computing; C; C++; Java; Jscript; design & complex distrib syst & frmwrks; algorithms & data struct; database design & storage syst optimization; ntwrking & security; compilers; comp arch; & mach learn.

**#1615.7587**; design, dvlpmnt, test, & implement sw algorithms, apps, & syst; Python 2.x & 3.x, Pylint, & Python coding styles; SWIG 1.x & 2.x; C, C++, & OO technologies; Brazilian laws & agreements concerning user abuse, child porn & data retention; release & test eng'g practices; & mach learn & cryptography.

**#1615.7488**; OOL;Java srvr side tech; data struct & algorithms; UNIX & Linux dvlpmnt; large sw syst; distrib syst; stat mach learn & info retrieval applications; web app dvlpmnt; & relational database design & SQL querying.

**#1615.4081**; C, C++, & Java; stats, mach learn, & data mining; algorithm design & analysis; computational complexity; UNIX & LINUX; & Python, Perl, & Shell.

**#1615.4984**; C++; Java; Go; Python; design & dvlpmnt of large-scale distrib syst; mgmnt & execute UNIX or Linux srvrs in datacenter environ; SQL & relational databases; & development of multi-thread prog.

**#1615.6944**; Java; Python; Jscript; & MySQL

**#1615.6411**; Java, Python, &/or C++; web frontend dvlpmnt; & unit test, algorithms, & data struct.

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Technical Product Specialist Lead (Mountain View, CA) **#1615.2243** Take responsibility for Google product from conception to launch. Exp incl: Jscript, HTML, Flash, & SQL databases; PHP & Python; tech customer support, QA, or tech workflow support; digital media solutions; & online ads of tech products.

Software Engineer Manager (Mountain View, CA) **#1615.3187**; Design, develop, modify, and/or test software needed for various Google projects. Exp incl: OOD; design large-scale distrib syst; multi-phase transactions; perf analysis of large syst; web-front end tech,security,&test;&lead team of engrs.

Business Systems Integrator (Mountain View, CA) **#1615.7790**; Design analytical solutions that answer complex business decisions. Exp incl: Oracle apps; supply chain & logistics processes; enterprise integration using Oracle SOA; & Oracle architecture, SQL, & scripting tools.

Software Engineer Positions (Mountain View, CA) Design, develop, modify, and/or test software needed for various Google projects. Exp. incl:

**#1615.7555** Java; UNIX or Linux; OO tech; database design & SQL; large-scale data index&process; web tech; & data struct, algorithms, & sw design.

**#1615.5511** sw eng'g; algorithm dvlpmnt; design of large-scale distrib syst; distrib database syst; & large-scale data process.

**#1615.424** design parallel, scalable, robust distrib syst w/ fault tolerance, consistency, & availability guarantees; large-scale data process syst; Python & cluster mgmt sys; C; design operat sys; Shell script & Linux commands; OOL; relational databases & SQL; design, implement, test, troubleshoot, & maint of comp syst & production sys; code editors & revision control sys; core web tech; & multithread & RPC syst.

**#1615.3864**; design & implement consumer-lvl apps; Java, Python, C++, & MapReduce; HTML, Jscript, CSS, Bash, SQL, & Linux Sys; NoSQL large-scale databases; algorithms & parallel prog; dvlpmnt of full-stack data visualization syst; implement & debug multi-layer real-time ntwrk-connected syst; & design & implement multi-thread web & mobile apps.

**#1615.3840** Java, C, or C++; OOP; large syst sw design & dvlpmnt; Unix; data struct; & algorithms.

**#1615.2965** distrib syst, mach learn, stats, & OOD; Java, C++, & Python; & domains.

**#1615.2580** dvlpmnt of large scale sw systs; Java; Python, & Bash; distrib syst; debug multiple subsyst; & design & implement sw.

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Technical Writer (NY, NY) **#1615.5584** Write and edit technical material for Google. Exp incl: tech writing, prod document, or online publish, incl writing tech cust-facing materials; research & writing tech documentation for sw; source code written in Java, C++, Python, &/or Jscript; HTML & CSS; version-control syst; UX or UI design; & APIs, SDKs, or web tech.

Software Engineer (NY, NY); **#1615.6663** Design, develop, modify, and/or test software needed for various Google projects. Exp incl: Java, C++, Jscript, & Python; HTML, XML, & CSS markup lang; Unix & Linux; large syst sw design & dvlpmnt; data struct, algorithms, & sw design; & asynchronous frontend dvlpmnt methodologies.

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Information Technology:
IT Corp., Aliso Viejo (Orange County), CA. has multiple openings at various levels for Systems Analyst - General. Will collect, review, analyze and recommend technology and tools; Use independent judgment and discretion to analyze computer system capabilities; Design and documents computer systems or programs, including prototypes, flowcharts and diagrams outlining system capabilities and processes. Provide technical training to project team. Global Delivery model exp. Excellent communication skills, able to communicate complex technical concepts to all levels. Excellent analytical and problem solving skills. Must be able to travel temporarily to unanticipated client sites with expenses paid by the employer and/or relocate throughout the US. Bachelor's Degree with 1 yr. of experience. Mail resume & position desired to Job Number: 004-1RAUST - Attn: Coleen Ryan-UST Global Inc. 20 Enterprise 4th Floor, Aliso Viejo, CA 92656

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Systems Analyst - General
IT Corp., Aliso Viejo (Orange County), CA. has multiple openings at various levels for Systems Analysts - General. Will collect, review, analyze and recommend technology and tools; Use independent judgment and discretion to analyze computer system capabilities. Travel and/or relocate to unanticipated client sites throughout† the US required. Bachelor's Degree with 2 yrs. of experience. Mail resume & position desired to Job Number: 005RAUST - Attn: Coleen Ryan-UST Global Inc. 20 Enterprise 4th Floor, Aliso Viejo, CA 92656

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Software Engineer Positions (San Bruno, CA) Design, develop, modify, and/or test software needed for various Google projects. Exp incl:

**#1615.1482** Python, HTML & Jscript; interface elements; and testing and deployment.

**#1615.4467** machine learning; convex optimization; and software engineering.

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Enterprise Application Engineer (Mountain View, CA) **#1615.7722**; Design, develop, modify, and/or test software needed for various Google projects. Exp incl: prog in Java, C, C++, &/or Python; Java core libraries, design patterns, JSP, servlets, & end-to-end web app prog; & OOD.

Software Engineering Manager (Mountain View, CA) **#1615.3383**; Manage a team of Software Engineers to design, develop, and/or modify software for various Google projects. Exp incl: eng'g mgmnt & architectural design; shipment of large-scale consumer electronics prod; syst sw; build sw eng team, incl recruit & hiring of team members; cloud-based srvcs; & app dvlpmnt.

Information Systems Auditor (Mountain View, CA) **#1615.7481**; Analyze financial and IT data for Google audit functions. Exp incl: SQL; relational & OLAP database struct; data analytics execution on large, global datasets; IT Syst Audit or IT security; spreadsheet model, forensic analysis, datasets, probability, & stats; model in R or SAS; OOP & script lang; ETL processes; & CFE certification, fraud compliance or AML.

Software Engineer (Mountain View, CA) **#1615.7480**; Design, develop, modify, and/or test software needed for various Google projects. Exp. incl: OOP & dvlpmnt tools; automatic test in functionality & syst-level integration; authentication, security, & encryption tech; remote procedure call syst; Linux & Unix oper syst; & script & version control.

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Systems Analyst - General
IT Corp., Aliso Viejo (Orange County), CA. has multiple openings at various levels for Systems Analysts - General. Will collect, review, analyze and recommend technology and tools; Use independent judgment and discretion to analyze computer system capabilities. Exp in Global Delivery model. Excellent communication skills, able to communicate complex technical concepts to all levels. Excellent analytical and problem solving skills. Travel and/or relocate to unanticipated client sites throughout the US required. Bachelor's Degree with 2 yrs. of experience. Mail resume & position desired to Job Number: 004RAUST - Attn: Coleen Ryan-UST Global Inc. 20 Enterprise 4th Floor, Aliso Viejo, CA 92656

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Software Engineer Positions (Venice, CA); Design, develop, modify, and/or test software needed for various Google projects. Exp incl:

**#1615.7809**; C++; large scale distrib syst; image process; & general image process infrastruct.

**#1615.6657**: C & C++; Matlab; Python; distrib syst; & stat mach learn or quantum info process.

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Software Engineer Positions (Mountain View, CA) #BG001; Design, develop, modify, and/or test software needed for various Google projects. Exp. incl: C++, Java, Jscript, Objective-C, &/or Python; distrib syst &/or algorithms; Linux &/or Unix; & mach learn.

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# SHARKTANK

TRUE TALES OF IT LIFE AS TOLD TO SHARKY

HAL MAYFORTH

## Well, If *She* Can't Use Her Tablet . . .

High-level administrator for this government agency calls the help desk to complain that the synchronized network L: drive on her Windows tablet is missing. "The tech asks if he can remote into her machine," says a pilot fish in the know. "She says to wait a minute while she saves her work in case he inadvertently shuts off her machine." Once she gives him the all-clear, the tech remotes in, minimizes the eight open windows, and starts looking for the L: drive. But suddenly Word opens and the administrator starts typing some notes. Tech lets her finish and then minimizes Word to see if the shortcut is in Recycle – but suddenly Word pops back up and the administrator starts typing again. That keeps happening, until finally fish sends the administrator an email explaining he'll need to log in and when he does she won't be able to use any apps. Reports fish, "He watches her close all open windows and then select Shut Down – and his connection dies."

## Plug and Don't Play

Every time there's a thunderstorm near this school, the building has power glitches and the temperamental Internet gateway flakes out and has to be manually restarted. "It seemed strange that even short power glitches would take down the network, especially since the equipment was plugged into a battery backup UPS," says a consultant pilot fish brought in to look at the problem. "But since the equipment was mounted up near the ceiling, it was rare that anyone actually checked on how things were hooked up. That is until we went over and put up a ladder. Like most mass-market UPS units, this one had two rows of outlets," says fish. "One row is clearly marked 'Surge + Battery Backup,' the other one is marked 'Surge Only.' The network equipment was plugged into one side, and the other row of outlets was unused and covered with dust. Guess which set of outlets the equipment was plugged into?"

## But You *Didn't* Use Them, True?

It's the turn of the millennium, and this pilot fish is hired as the IT manager for several of a company's branch offices. "We had great ambitions – six new IT projects were planned for the upcoming fiscal year," says fish. "Then 9/11 happened. Sales plummeted, and the budgets for all six IT projects were cut. For example, having a server to send faxes over the network would have to wait – the good ol' fax machines would have to suffice for now. The following year at my performance review, the CIO marked me down for 'not utilizing my project management skills.' That's right, not utilizing my skills to manage six projects – that had all been cut."

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**OPINION**

# S.J. VAUGHAN-NICHOLS

## After Ballmer: Can This Company Be Saved?

> Even as he exits, Ballmer is changing how Microsoft will run for years to come.

**IF THERE'S ANYTHING SADDER** in tech circles than a pathetic Windows fan still trying to convince himself that Windows 8.x has been anything other than a total failure, it would have to be someone who believes that Steve Ballmer did anything during his tenure as Microsoft's CEO other than set the company up to follow in the footsteps of failed U.S. carmakers.

Scot Finnie, *Computerworld*'s editor in chief, recently spelled out Ballmer's shortcomings. Bottom line: Microsoft lost its vision. Instead of being a leader, it's been playing catch-up in mobile, tablets and search while losing its way on the desktop with its user-hostile Metro interface.

You don't have to believe us. Look at the numbers. Microsoft's board cut Ballmer's bonus because of an 18% decline in Windows Division operating income and a $900 million inventory charge related to Surface RT.

I've been saying Microsoft should fire Ballmer since 2008. Instead, he's leaving on his own terms. Even as he heads to the door, Ballmer is changing how the company will run for years to come. Of the dubious decisions he has made recently, the $7 billion purchase of Nokia doubled down on the bet Microsoft made, with Surface, to betray its hardware partners. He did make a smart, though long overdue, move to jettison the hated "stack ranking" employee evaluation system (see story, page 6). But whether the moves have been smart or dumb, you have to wonder how much influence the new CEO can have when he'll have to live with all these lame-duck strategic decisions.

Speaking of the new CEO, have you looked at the short list of candidates? Yack! (That's shorthand for, "Who in this group has what it takes to redeem this faltering company?")

The most well known in technology circles is Stephen Elop. He's a former Microsoft executive, so that qualifies him, right? Oh yeah, he also led Nokia to ruin. There's a crazy theory that Elop was a Microsoft plant at Nokia, sent to wreck it and make it cheaper to buy. Definitely crazy, until you try to come up with a reason for him to be a serious candidate that makes any sense.

Alan Mulally seems to have done well at Ford, but he's played games in describing just how well the automaker has done under him. For example, while it's true that Ford didn't get funds from the Troubled Asset Relief Program, it did rely on government support to keep its head above water at the start of the Great Recession. By the way, Mulally knows nothing about the tech business.

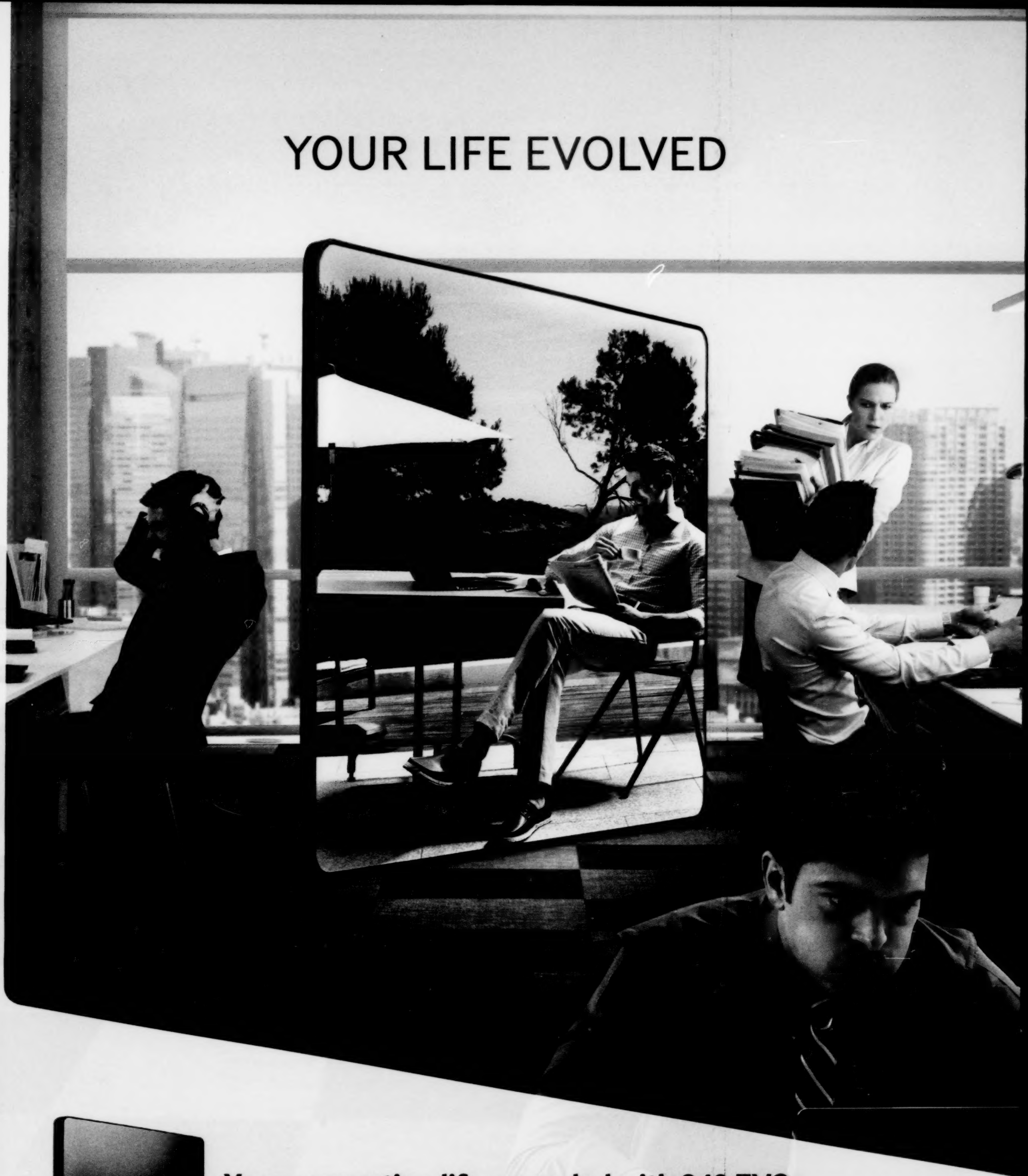
Satya Nadella has overseen Microsoft's money-losing online business lines, such as Bing.

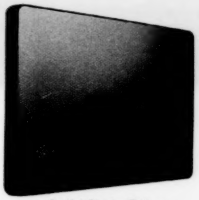
Kevin Turner is Microsoft's COO. In that role, he's been in charge of Microsoft's ad sales, sales and marketing, and public relations since 2006. Well, I guess it isn't really his fault that his teams couldn't make winners out of dogs like Windows 8.x, Windows Phone, Zune and Surface.

The one person the Microsoft board is considering who seems like a reasonable choice is Tony Bates. The former CEO of Skype has shown that he can handle both the tech and management sides of business. But I doubt they'll pick him. He's only been with Microsoft since 2011.

But where are the visionaries? How about a leader who can radically transform a business? I don't see any. Can any of them make a slow company agile enough to compete against nimble players like Amazon, Apple and Google? I don't see that happening. Instead, I see the 2010s shaping up as the decade of Microsoft's decline. ◆

**Steven J. Vaughan-Nichols** has been writing about technology and the business of technology since CP/M-80 was cutting-edge and 300bps was a fast Internet connection – and we liked it! He can be reached at sjvn@vna1.com.





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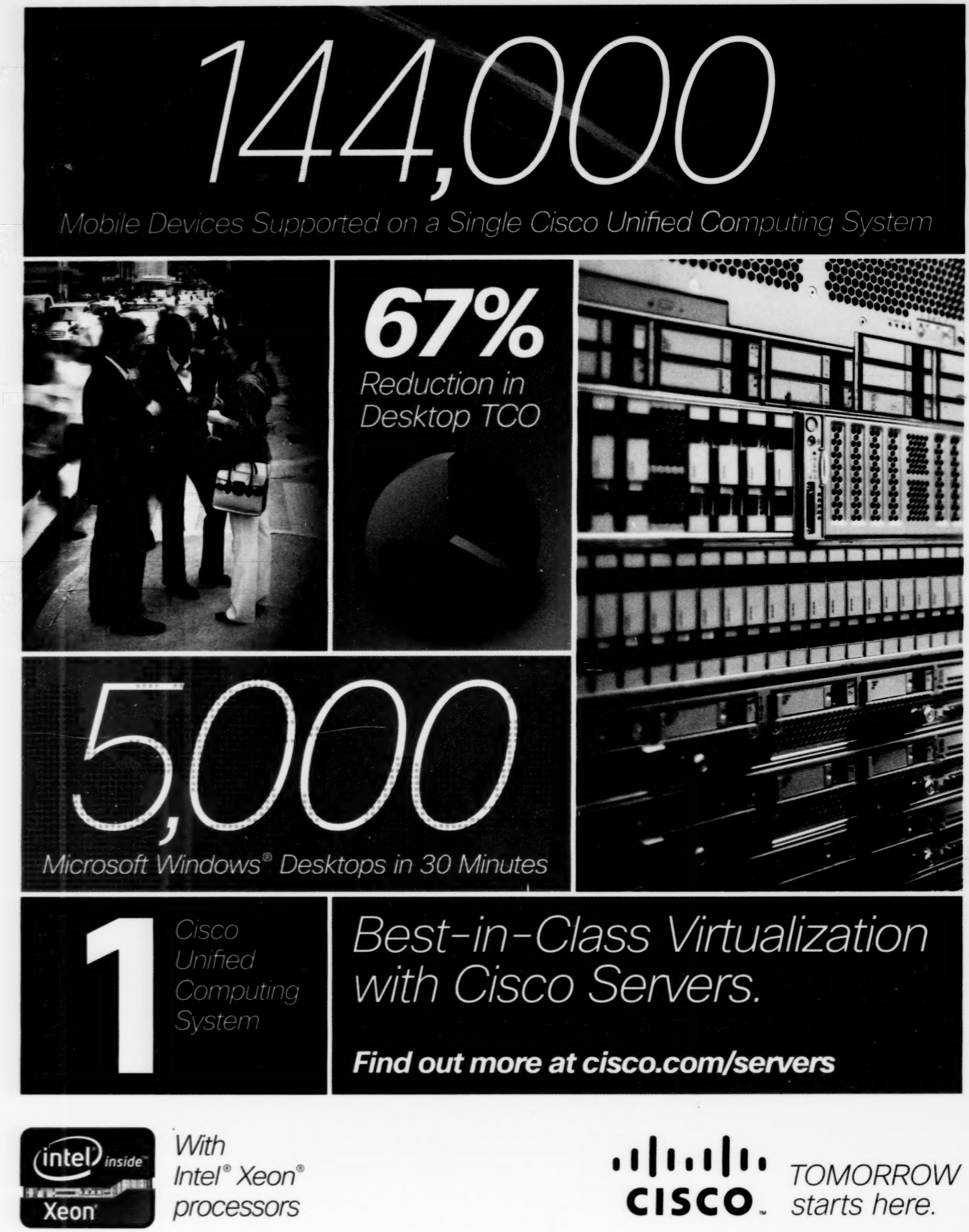

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